TOTAL SYSTEM DEVELOPMENT
FEASIBILITY PHASE GUIDELINES

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1. GENERAL

1.01 The purpose of the Feasibility Phase is to define specific user requirements for a system, to develop and describe conceptual alternatives that will satisfy those requirements, and recommend the best system alternative.

1.02 Whenever this section is reissued, the reason(s) for reissue will be included in this paragraph.

1.03 This section is a guideline. It provides expanded information in support of the concepts of Total System Development specified in Section 007-220-300*, Total System Development — Milestones.

*Check Divisional Index 007 for availability.

1.04 The Feasibility Phase initiates the system analysis process which continues through the Definition Phase. During feasibility, the existing situation is evaluated, and the user's business-related goals are identified. Alternative ways (systems) for meeting these goals are explored in terms of operational, technical, and economic feasibility. The most attractive solution is identified and recommended for development.

1.05 Conceptual solutions are developed in feasibility so that system costs and the potential worth of the system can be evaluated before significant resources are committed to the effort. While the selected solution provides a technical direction for subsequent phases, the appropriateness of the solution must be reexamined as the requirements of the system are further defined. If a better technical approach is identified, it should always be possible to redefine and redirect the project effort.

2. CURRENT ENVIRONMENT

2.01 System analysis begins with an evaluation of the existing environment. The following are some of the factors that should be investigated:

(a) Organization structures, functions, and responsibilities

(b) Current and future business goals, (costs, productivity, indexes, service, financial factors, force levels, etc)

(c) Existing systems (objectives, procedures, products, data bases, resources, costs, performance measures, etc).

2.02 This initial analysis step is very important. An understanding of the user's situation is vital to accurate identification of user needs and necessary system capabilities. Also, a description of the current environment is necessary in order to provide a base line against which new system requirements

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and conversion requirements can be identified, and system performance can be measured.

2.03 The scope of this analysis should be defined in the Proposal Phase Project Initiation Request in terms of organizations, functions, or application areas to be investigated. The level of detail for the analysis will depend on the application knowledge of the team members, adequacy of existing documentation, nature of the problem and/or opportunity being investigated, time available, potential costs/benefits, etc.

2.04 Typically, detailed data collection on the current environment will continue throughout the Feasibility and Definition Phases. At each point in the analysis process, however, sufficient information must be collected to support the specific decisions being made.

3. PROBLEMS AND OPPORTUNITIES

3.01 During the investigation of the current environment, a variety of problems or opportunities may be identified. Problems exist when goals and objectives are not being met; they result from inefficiency (process) or ineffectiveness (product or result). Problems will typically relate to:

(a) Procedures

(b) Products, information, or results

(c) Documentation

(d) Training

(e) Organization/staffing

(f) Operating costs

(g) Changes in business, economic, legal, or environmental demands.

3.02 Problems should be defined as specifically as possible. The impact (economic or operational) of each problem must be determined. Required or desired levels of improvement should be established. Based on this analysis, all significant problems should be prioritized in terms of need for solution. Data from any previous performance analysis studies will be useful imput to this activity.

3.03 Opportunities for improvement usually arise as a result of business, operational, or technological changes. The nature of the opportunity and the benefit to be derived from taking advantage of it should be identified.

4. USER NEEDS

4.01 It is unlikely that any single project effort will be able to satisfy all problems or opportunities. Therefore, some project scoping should be performed at this point by determining the specific user needs that will be addressed in the development of alternative system solutions.

4.02 User needs are usually defined with reference to the existing system or environment in terms of changed, improved, or new capabilities to be provided by the proposed system. The needs may be stated as either functional (new or revised output, improved accuracy, or timeliness) or operational (increased productivity, ability to accommodate growth). The performance target or requirement for each need should be specified.

4.03 The effects on the business of attaining the user needs are described. The needs can then be prioritized on the basis of necessity, benefit, payoff, impact, etc, to the business. This priority and performance information is critical to the development and evaluation of alternative solutions since each alternative will satisfy the total set of user needs in different ways and extents (depending upon scope, cost, technical configuration, etc).

4.04 If any of the previously defined problems or opportunities have been excluded from further consideration, it may be appropriate to recommend disposition of these items by other organizations.

5. GENERAL ASSUMPTIONS AND CONSTRAINTS

5.01 Since the system to be developed will be installed somewhere in the future (near or distant) it is frequently necessary to make some assumptions about the nature of the environment that will exist at that point in time. Assumptions may relate to growth rates, organizations, legal or regulatory decisions, technological advancements, etc. All such assumptions and their probability of occurrence should be formally identified as early as possible since they will have an impact on any system that is developed. The validity of these, and any additional major assumptions that are made during de-

velopment, must be carefully monitored in order to identify any deviations that will influence system or project plans.

5.02 Likewise, any contraints on the system or project should be identified. Constraints will typically relate to:

(a) Interfacing systems

(b) Legal or regulatory directives

(c) Technical capabilities

(d) Organization/environment

(e) Economic factors

(f) Schedules, eg, required operational time frame, installation, etc.

Constraints, by their nature, are usually fixed. However, it may be possible or necessary to challenge any one of them if no acceptable solution is permitted with the constraint in effect.

6. ALTERNATIVE SYSTEM MODELS

6.01 The development of alternative models to satisfy the user needs that have been established invloves the following highly interactive activities:

(a) Establish system objectives

(b) Establish business objectives

(c) Determine system outputs

(d) Determine system inputs

(e) Determine system data

(f) Develop functions

(g) Determine conversion considerations and user impact.

6.02 A system model portrays the primary- or high-level functions to be included within the system, the general data requirements for the system (input, data groups, and outputs), and the general processing mode or physical configuration that is needed to support system performance requirements.

6.03 Alternative system models usually differ with respect to scope and/or processing mode. Most systems have natural boundaries. The design boundary that is selected is usually more narrow in scope. If the design boundary does not include the entire system, it is typically because other portions of the system have been previously developed or mechanized, or do not lend themselves (technically or economically) to development at this time. The design boundary may also be narrowed in order to keep development time within a manageable range. Thus, alternatives of various scopes can (and perhaps should) be investigated, each providing a different set of outputs and capabilities for a given cost and development schedule.

6.04 System models also vary depending on the processing mode considered. For example:

(a) Manual processing

(b) Batch

(c) Time-share

(d) On-line

(e) Distributed

(f) Data base

(g) Processor (large main frame, minicomputer, microcomputer, etc)

(h) Combinations of the above.

Each type of processing mode permits functions to be performed in different ways, with different performance levels, and usually, at different costs.

6.05 The investigation of alternative system models may be based on analysis of initial system user requirements alone, or it may be guided by Bell System direction or knowledge of similar systems in other companies. The models may also be influenced by existing or planned mechanization efforts. Obviously, it is important that the eventual system configuration be compatible with the total corporate data system plan and overall system architecture.

6.06 The development of alternative system models requires a great deal of system expertise and experience. The analyst must examine the user needs and be able to conceptualize the various scoping and processing options that are feasible before proceed-

ing to detail the actual models. This requires knowledge of the application, technical state-of-the-art, system design principles, system's interfaces and boundaries, corporate plans, etc. Since subsequent development and management decision-making is based on the validity of these system alternatives, it is important that the proper skills be provided for this front-end analysis.

6.07 The following items of information are included in each alternative system model description:

(a) ***System Objectives:*** Specific, measurable objectives must be established for each alternative model. These objectives should specify the information to be provided by the system and the performance characteristics for system processing, outputs, and administration. System objectives will fall into three classes:

(1) Information or output (with associated performance criteria such as schedule, quality, availability, etc)

(2) System integrity (with associated performance criteria such as reliability, availability, control characteristics, etc)

(3) Administration (with associated performance criteria such as flexibility, maintainability, operability, etc).

In setting system objectives, the analyst must clarify the need and purpose for each objective. The requirement for and intended usage of system outputs must be understood. Performance characteristics must be based on actual user requirements, and they should be set no more no or less stringently than is necessary to satisfy those needs. For the selected alternative, the system objectives become the high-level commitment against which the operational system's performance will be measured.

(b) ***Business Objectives:*** Attainment of information system objectives must result in some specific and measurable impact on the business. Therefore, the business objectives that will be achieved with each system alternative must be defined (eg, improved index, reduced work force, inventory reduction, improved revenues, etc). This is often difficult and involves considerable judgment. Consultation and verification with users and application experts is usually required. However, accurately determining this business impact is the key to the selection of the best alternative for development. For the selected alternative, the business objectives become a commitment against which the real success of the system is measured.

(c) ***System Outputs:*** The system objectives define the general types and categories of information to be provided by the system. These information needs must be analyzed to determine specific system outputs that must be produced. Each output should be described in terms of user, purpose, content, volume, and performance requirments (quality, schedule, security, etc). The level of description for each output may vary depending upon whether the ***output is identical*** or similar to output currently provided or ***is entirely new*** (the degree of analysis that can reasonably be accomplished during the phase or the adequacy of definition of the user function that requires the output).

(d) ***System Inputs:*** Once output requirements are known, the data required as system input can be determined. If an input source already exists, input quality should be examined in order to determine how well the data will satisfy new system performance requirements. If the quality (accuracy, schedule, etc) is not adequate, modifications at the source, alternative sources, or changes in the system boundaries to include data capture or processing may have to be investigated. For new data requirements, potential sources and means for data capture will have to be identified. The level of description for each input may vary depending upon whether the input exists or is entirely new.

(e) ***System Data:*** Most systems create and/or store data within the system through the use of temporary files, tables, data bases, etc. Of primary interest in feasibility are the major file and data base requirements (data accessed from other systems' data bases are considered system inputs). These data requirements should be described in terms of content, usage, volume and growth, security requirements, etc. Additionally, the need for sharing of data bases should also be determined.

(f) ***System Functions:*** The basic functions of the system must be defined in sufficient detail to permit:

(1) A reasonably accurate view of the system's operational characteristics and capabilities

(2) The determination of the physical resources required to support that particular processing mode or configuration

(3) The estimation of developmental and operating costs

(4) An analysis of the environmental impact and benefits of the system.

(g) ***Conversion Considerations and User Impact:*** The ease or difficulty of modifying the environment to accommodate each alternative system model must be evaluated. Existing data may have to be converted, and this effort alone could have significant technical and economic implications for a given alternative. It may also be necessary to create new records if none are available or if current data is unacceptable. Existing methods and/or interfacing systems may have to be modified. Facilities may have to be altered or acquired. Also, the impact of the system on company organizations should be considered. Work force size or composition, organizational structures, measurements, and/or work policies and procedures may be affected. All such major conversion and environmental factors should be determined as they may have a significant bearing on the relative attractiveness of each of the alternatives investigated.

6.08 Each system model depicts the system boundaries and user interface, the system inputs and outputs, and the data flow and processing functions within the system. Because it also reflects the processing mode that has been selected, some general function and resource allocation assumptions must be made. While the functional model must be sufficiently definitive to permit estimation of resources, costs, and schedules, it is developed so early in the systems process that it must be regarded as only a conceptual approach that will be either validated or altered as development proceeds for the selected alternative.

7. ECONOMIC ANALYSIS

7.01 The cost and benefits of each system alternative must be identified in order to evaluate the absolute and relative merits of the alternatives that have been investigated.

7.02 System cost estimates must be developed for:

(a) System development by phase

(b) One-time conversion cost

(c) System operation over life of system

(d) System maintenance.

Because this cost analysis is performed prior to definition and design of the system, it is unlikely that estimates will be entirely accurate. For that reason, ranges of values may be presented along with a description of the factors that would cause the cost to move to the low or high end of the range.

7.03 System benefits are derived from three sources:

(a) Savings associated with performing current functions in a more cost-effective manner

(b) Benefits resulting from the addition of new functions or services

(c) Incidental benefits that will result from the system, beyond the satisfaction of system objectives (eg, cost avoidance, improved control, reduced turnover, reclamation of expenses on equipment, etc).

7.04 Benefits may be classified in two ways:

(a) Economic or noneconomic

(b) Tangible (measurable) or intangible (unmeasurable or difficult to quantify).

7.05 Once all costs and benefits have been determined, the cost/benefit ratio for each alternative can be calculated. In addition, the overall financial impact of the alternatives can be evaluated in terms of cash flow requirements, payback period, risk, etc.

8. RECOMMENDATIONS

8.01 The Feasibility Team should analyze the various alternatives developed and determine the most attractive course of action. This analysis will be based on the following factors:

(a) The extent to which the user needs are satisfied.

(b) Economic factors.

(c) Development requirements (technical, cost, schedule, etc).

(d) Operational impact.

8.02 A specific recommendation should be prepared describing the selected alternative and the reasons why it was deemed superior to the other alternatives. One alternative that should be considered at this point is to maintain the status quo and not recommend any of the system models considered.

9. END-OF-PHASE ACTIVITIES

9.01 Depending upon the type of system that is proposed, it may be appropriate to conduct a review of the Feasibility Phase findings and recommendations. Such a review will serve to:

(a) Verify data collection findings.

(b) Assure that all potential system users have been identified.

(c) Verify that all system interfaces have been considered.

(d) Validate user needs.

(e) Verify assumptions and constraints.

(f) Assure that the best technical solutions have been utilized.

(g) Assure that projected facility requirements can be satisfied.

The review will typically involve such groups as Operational Approval, Support, Users, Computer Center Administration, or any other group that will be impacted by the system or that can contribute technical expertise to the evaluation.

9.02 The results of the Feasibility Phase Analysis are submitted to the appropriate project approval entity to obtain authorization to proceed. The project approval entity should evaluate the recommendation in terms of the following types of factors:

(a) Nature of system requirements: mandatory versus discretionary.

(b) Whether the projected cost/benefit of the system is sufficiently attractive to warrant development.

(c) Relative priority of the system.

(d) The system's compatibility with long-range plans and needs.

(e) Whether resources are available to assign to the effort.

Based on these variables, those responsible for project approval may elect to approve the recommended approach, select another alternative, or defer or cancel the project.

10. REFERENCES

10.01 The following sections will provide additional information relevant to the Feasibility Phase:

SECTION	TITLE
007-200-310	Functional Roles in a Systems Environment
007-208-310	Project Management
007-220-300	Total System Development — Milestones
007-227-310	Developmental Documentation Specifications.